AMERICAN JOURNAL OF PHARMACY

AND THE SCIENCES SUPPORTING PUBLIC HEALTH

Since 1825

COMMITTEE ON PUBLICATION

E. Fullerton Cook, Sc. D., Ph. M. Mitchell Bernstein, M. D. J. W. Sturmer, D. Sc.
John K. Thum, Ph. M. Arno Viehoever, Ph. D. Joseph W. E. Harrisson, Ph. M

IVOR GRIFFITH, Ph. M., Sc. D., Editor
Linwood F. Tice, M. Sc., Assistant to the Editor
John E. Kramer, B. Sc., Business Manager

Vol. 110. SEPTEMBER, 1938 No. 9

CONTENTS

Editorial:

Socialized Medicine 396

Original Articles:

The Usefulness of Useless Knowledge. By Abraham Flexner, Princeton, N. J. 399

Moxa, a Strange Medical Treatment. By Olga Jonkus and Robert Charr, White Haven, Pa. 406

Reprinted Article:

The Evaluation of Yellow Mustard. By Arno Viehoever and Walter L. Nelson, Philadelphia, Pa. (Reprinted From the *J. A. O. A. C.*) 411

Abstracts from, and Reviews of, the Literature of the Sciences Supporting Public Health 418

Solid Extracts 426

Book Reviews 429

Annual Subscription, $3.00 Foreign Postage, 25 Cents Extra

Single Numbers, 30 Cents. Back Numbers, 50 Cents

Entered as Second-Class Matter at the Post Office at Philadelphia, Pa., Under the Act of March 3, 1879

Acceptance for Mailing at Special Rate of Postage Provided for in Section 1103 Act of October 3, 1917. Authorized February 15, 1920

EDITORIAL

On these pages the editor offers his opinions, unshackled by advertising patrons and unrestrained by anything save a sense of the decent and the truthful—the editor, alone, is responsible for their type, their tone and their tenor.

SOCIALIZED MEDICINE

IT IS a cowardice of the first water to believe that trends, just because they are trends may not, or should not be combatted, if such trends appear destructive. The plan of the present government to spend, over a period of a few years, eight billions of dollars on a program of public health is in line with the paternalistic trend of the times, but that should not deter those who feel that our democracy has reached its majority and has no need for such a patronizing paternalism, from protesting, and from protecting their fundamental interests.

The American Medical Association is bending every effort to oppose the government's plan. Generally speaking it has every right to do so—but why did it wait so long?

Why did it wait until now to marshall its forces, to attempt a consolidation of all the professions serving public health into a fighting unit—only to find that the opposition is better prepared, more strongly entrenched, and with a tremendous man power, enticed to the ranks with drumbeat and foolish fanfare.

Sometime ago (1932) this Journal printed the following editorial. It is reprinted now, because little seems to have come to cause a change in its sentiments, and it *does* suggest that pharmacy, then as now, in all of its ramifications, has been ready to join organized medicine in any worthy public-serving enterprise:

Stated the 1932 editorial, "No one with a knowledge of the facts involved and presuming to exercise a fair sense of judgment can fail to admire the American Medical Association for the organized way in which it has achieved to most of its objectives.

The technique of its actual leaders, the so-called permanent medical autocracy, with headquarters at Chicago, has been effective to an unusual degree—and this, in spite of the fact, strangely enough, that the average medical man, even though a member of the Association, hardly ever speaks of the political leaders, responsible for its destinies, with else than disaffection.

Yet, presuming that the leadership has been so far successful, they benignly accept its ministry, with the same degree of indifference and apathy that the mackerel accepts the ocean.

Their leaders have served them well. There has been conserved for them, within their profession, a self-government that has no equal in latitude and freedom in any other trade or profession.

Yet, today, it is an assured fact that medicine is facing a change which, strange enough to precedent, is destined to occur through influences outside the profession itself. And that change is the inevitable result of the holier-than-thou attitude maintained by the aforementioned medical leaders—who in the dumb sublimity of faith in their narrow policies have either incurred the ill will or lost the friendship of agencies which might otherwise have supported them—at least in their *good works.*

One does not have to be abundant in discernment to observe that the present practice of medicine is inadequate to the nation's needs. Nor does one have to read the voluminous report of the Committee on the Costs of Medical Care to so conclude.

Proof enough is had in the existence of the heterogeneity of medical cults, ministering, for good and for bad, to the untutored demands of a public left medically stranded.

There are more foolish —ics, and —paths, and detours to legitimate medicine than ever existed, and they have no real right to exist.

And, many intelligent people—people who have the capacity of being discriminate—so often find so little satisfaction at the hand of the regular system of medicine—find so little satisfaction being bandied about, among self-appointed specialists, that eventually *sans* tonsils, *sans* teeth, *sans* appendix and *sans* confidence, they seek a healing elsewhere—and oddly enough they often, often find it in the most unlikely places.

Patent medicines flourish as they never flourished before and instead of a regulated sale through pharmaceutical channels they are sold indiscriminately by grocers, cut-rate merchandizers, and department stores—all this, in spite, or because of, the campaign of education fostered by the Chicago headquarters.

These are but isolated proofs of organized medicine's misdirection of fundamentals. While Chicago's solons are busy certifying crackers and cheese—and compiling tonics and sedatives—the really great problems in medicine have been either neglected or mishandled.

And now looms the denouement.

One of the straws that points to the change which is undeniably imminent is the recent majority report of the Committee on the Costs of Medical Care, where the State Control of Medical Practice is offered as the way out of the hectic maze occasioned by the acknowledged failure of modern medicine to function to the best advantage of our social structure.

The minority report, and the American Medical Association are united in a frantic disavowal of the aforementioned majority report—and in view of the past and present policy of that powerful organization one would hardly expect anything else.

After a forceful and patient campaign of education and action the American Medical Association came very close to exterminating that beloved old institution—the family doctor. The smaller medical colleges which had been very successful in turning out doctors who remained close to their people, and who had the desire and capacity to serve—those colleges were throttled. And the new plan of medical education was so disposed that it aborted an overwhelming horde of would-be specialists, for whom human beings were experimental animals—and who required years of extra-mural disillusion to make them useful in their work of healing.

No wonder that the cults have damagingly flourished. No wonder that the patent medicine is staging a comeback!

But—there are some signs, too, of an awakening at headquarters. For instance, an editorial appearing in a recent issue of the Journal champions the return of "the general practitioner"!!! And what a turn-about-face that is!!!

But, just the same—there is a legible "handwriting on the wall"—and *pro bono publico*—not *pro bono medico*—it will be heeded."

The foregoing was printed in 1932. Today's medical dilemma indicates that there are elements of prophesy in the bit of writing.

IVOR GRIFFITH.

ORIGINAL ARTICLES

THE USEFULNESS OF USELESS KNOWLEDGE

By Dr. Abraham Flexner

Director of the Institute of Higher Studies of Princeton University

IT is a strange contradiction that in the midst of a world torn by irrational hatreds that threaten civilization itself we are this afternoon dedicating a laboratory and the services of devoted young men and women to the extension of knowledge, to the cure of disease, and to the amelioration of suffering. Life has never been logical—neither the life of nations nor the life of individuals. It is perhaps fortunate that illogicality can do something to rationalize and beautify human existence.

I shall speak to you for a few moments on a few aspects of irrationalism, for surely it is an irrational fact that it so often happens that the ceaseless quest of the useless should—sometimes soon and sometimes later—result in conferring some great practical boon upon harassed and floundering mankind.

It is said with tiresome iteration that ours is a materialistic age and that its main concern should be the wider distribution of material goods and worldly opportunities. Let us accept this point of view.

To whom shall we go for this nearer approach to the millenium. Not assuredly to those who are primarily engaged in the manufacture of goods or in the creation of concrete opportunities. The men and women who are today making the largest contribution to human happiness and human health are the quiet workers in laboratories and libraries and who in the pursuit of a devoted career do not pause to ask themselves "what is the use."

I recall a conversation which I had some years ago with Mr. George Eastman on the subject of use. Mr. Eastman, a wise and gentle far-seeing man, gifted with exquisite taste in music and art, had been saying to me that he meant to devote his vast fortune to the promotion of education in useful subjects. I ventured to ask him whom he regarded as the most useful worker in science in the world.

† Delivered at the ceremony dedicating the Squibb Institute for Medical Research, New Brunswick, N. J., Tuesday, October 11.

He replied instantaneously, "Marconi." I surprised him by saying:

> "Whatever pleasure we derive from the radio or however wireless and the radio may have added to human life, Marconi's share was practically negligible."

I shall not forget his astonishment on this occasion. He asked me to explain. I replied to him:

> "Mr. Eastman, Marconi was inevitable. The real credit for everything that has been done in the field of wireless belongs, as far as such fundamental credit can be definitely assigned to anyone, to Professor Clerk Maxwell, who in 1865 carried out certain abstruse and remote calculations in the field of magnetism and electricity. Maxwell reproduced his abstract equations in a treatise published in 1873. Other discoveries supplemented Maxwell's theoretical work during the next fifteen years. Finally in 1887 and 1888 the scientific problem still remaining—the detection and demonstration of the electro-magnetic waves which are the carriers of wireless signals—was solved by Heinrich Hertz, a worker in Helmholtz's laboratory in Berlin. Neither Maxwell nor Hertz had any concern about the utility of their work; no such thought ever entered their minds. They had no practical objective. The inventor in the legal sense was of course Marconi, but what did Marconi invent? Merely the last technical detail, the now obsolete receiving device called a coherer, almost universally discarded."

Hertz and Maxwell invented nothing, but it was their apparently useless theoretical work which was seized upon by a clever technician and which has created new means of communication, utility, and amusement by which men whose merits are relatively slight have obtained fame and earned millions.

Who were the fundamentally useful men? Not Marconi, but Clerk Maxwell and Heinrich Hertz. Hertz and Maxwell were geniuses without thought of use. Marconi was a clever inventor with no thought but use.

The mention of Hertz' name recalled to Mr. Eastman the Hertzian waves, and I suggested that he might ask the physicists of the University of Rochester precisely what Hertz and Maxwell had done; but one thing I said he could be sure of, namely, that they had done the work without thought of use and that throughout the whole history of science most of the really great discoveries which had ultimately proved to be beneficial to mankind had been made by men and women who were driven not by the desire to be useful, but merely by the desire to satisfy their curiosity.

"Curiosity?" asked Mr. Eastman.

> "Yes," I replied, "curiosity, which may or may not eventuate in something useful, is probably the outstanding characteristic of modern thinking. It is not new. It goes back to Galileo, Bacon, Sir Isaac Newton, and to the Greeks, and it must be absolutely unhampered. Institutions of learning and institutions of research should be devoted to the cultivation of curiosity and the less they are deflected by considerations of immediacy of application, the more likely they are not only to contribute to human welfare, but to the equally important satisfaction of intellectual interest which may indeed be said to have become the ruling passion of intellectual life in modern times."

What is true of Heinrich Hertz working quietly and unnoticed in a corner of Helmholtz's laboratory in the later years of the nineteenth century may be said of scientists the world over for several centuries past. We live in a world that would be helpless without electricity. Called upon to mention a discovery or invention of the most immediate and far-reaching practical use we might well agree upon electricity. But who made the fundamental discoveries out of which the entire electrical development of more than one hundred years has come?

The answer is interesting. Michael Faraday's father was a blacksmith; Michael himself was apprenticed to a bookbinder. In 1812—when he was already twenty-one years of age—a friend took him to the Royal Institution, where he heard Sir Humphrey Davy deliver four lectures on chemical subjects. He kept notes and sent a copy of them to Davy. The very next year—1813—he became an assistant in Davy's laboratory, working on chemical problems. Two years later he accompanied Davy on a trip to the continent. In 1825, when he was thirty-four years of age, he became director of the Laboratory of the Royal Institution, where he spent fifty-four years of his life.

Faraday's interest soon shifted from chemistry to electricity and magnetism, to which he devoted the rest of his active life. Important but puzzling work in this field had been previously accomplished by Oersted, Ampere, and Wollaston. Faraday cleared away the difficulties which they had left unsolved and by 1841 had succeeded in the induction of the electric current. Four years later, a second, equally brilliant, epoch in his career opened when he discovered the effect of magnetism on polarized light.

His earlier discoveries have led to the infinite number of practical applications by means of which electricity has lightened the burdens and increased the opportunities and resources of modern life. His later discoveries have thus far been less prolific of practical results.

What difference did this make to Faraday? Not the least. At no period of his extraordinary career was he interested in utility. He was absorbed in disentangling the riddles of the universe—at first, chemical riddles; in later periods, physical riddles. As far as he cared, the question of utility was never raised. Any suspicion of utility would have restricted his restless curiosity. In the end, utility resulted, but it was never a criterion to which his ceaseless experimentation could be subjected.

Let us look in another direction. In the domain of medicine and public health the science of bacteriology has played for half a century the leading role. What is its story?

Following the Franco-Prussian War of 1870 the German Government founded a great university at Strassburg. Its first professor of anatomy was Wilhelm von Waldeyer, subsequently professor of anatomy in Berlin.

In his "Reminiscences" Waldeyer relates that among the students who went with him to Strassburg during his first semester, there was a small, inconspicuous, self-contained youngster of seventeen, by name Paul Ehrlich. The usual course consisted of dissection and microscopic examination of tissues. Ehrlich paid little or no attention to dissection, but as Waldeyer remarks in his "Reminiscences":

> "I noticed quite early that Ehrlich would work long hours at his desk, completely absorbed in microscopic observation. Moreover, his desk gradually became covered with colored spots of every description. As I saw him sitting at work one day, I went up to him and asked what he was doing with all his rainbow array of colors on his table. Thereupon this young student in his first semester supposedly pursuing the regular course in anatomy, looked up at me and blandly remarked, 'Ich probiere'. This might be freely translated, 'I am trying' or 'I am just fooling'. I replied to him, 'Very well. Go on with your fooling." Soon I saw that without any teaching or direction whatsoever on my part I possessed in Ehrlich a student of unusual quality."

Waldeyer wisely left him alone. Ehrlich made his way precariously through the medical curriculum and ultimately procured his degree mainly because it was obvious to his teachers that he had no intention of ever putting his medical degree to practical use. He went subsequently to Breslau, where he worked under Professor Cohnheim, the teacher of our own Dr. Welch, founder and maker of the Johns Hopkins Medical School.

I do not suppose that the idea of use ever crossed Ehrlich's mind. He was interested. He was curious. He kept on "fooling." Of

course, his "fooling" was guided by a deep instinct—but it was a purely scientific, not a utilitarian motivation. What resulted?

Koch and his associates established a new science—the science of bacteriology. Ehrlich's experiments were now applied by a fellow student, Weigert, to staining bacteria and thereby assisting in their differentiation. Ehrlich himself developed the staining of the blood film with the dyes on which our modern knowledge of the morphology of the blood corpuscles, red and white, is based. Not a day passes but that in thousands of hospitals the world over Ehrlich's technique is employed in the examination of the blood.

Thus the apparently aimless fooling in Waldeyer's dissecting room in Strassburg has become—without anyone's suspecting the result—a main factor in the daily practice of medicine.

I am not for a moment suggesting that everything that goes on in laboratories will ultimately turn to some unexpected practical use or that an ultimate practical use is its actual justification. Much more am I pleading for the abolition of the word "use" and for the freeing of the human spirit.

To be sure, we will thus free some harmless cranks. To be sure, we will thus waste some precious dollars, but what is infinitely more important is the fact that we will be striking the shackles off the human mind and setting it free for the adventures which in our own day have taken Hale and Rutherford and Einstein and their peers millions of miles into the uttermost realms of space and loosed the boundless energy imprisoned in the atom.

What Rutherford and others like Bohr and Millikan have done out of sheer curiosity in the effort to understand the construction of the atom has released forces which may transform human life, but this ultimate and unforeseen and unpredictable practical result is not offered as a plea in justification of their careers. Let them alone.

No educational administrator can possibly direct the channels in which these or other gifted men shall work. The waste, I admit again, looks prodigious. It is not really so.

All the waste that could be summed up in developing the science of bacteriology is as nothing compared to the advantages which have accrued from the discoveries of Pasteur, Koch, Ehrlich, Theobald Smith, and scores of others—advantages that could never have accrued if the idea of possible use had governed their minds.

These great artists—scientists and bacteriologists—disseminated the spirit which prevailed in laboratories in which for all they and others knew they were simply following the line of their own natural curiosity.

In this connection and in the atmosphere which envelopes the world today it is perhaps timely to emphasize the fact that the part played by science in making war more destructive and more horrible was an unconscious and unintended by-product of scientific activity.

Lord Rayleigh, president of the British Association for the Advancement of Science, in a recent address points out concretely how the folly and stupidity of man, not the intention of the scientist, is responsible for the destructive use of the agents employed in modern warfare.

The innocent study of the chemistry of carbon compounds, which has led to infinite beneficial results, incidentally showed that the action of nitric acid on substances like benzene, glycerine, cellulose, etc., resulted not only in the beneficent aniline dye industry but in the creation of nitro-glycerine, which has uses good and bad. Somewhat later Alfred Nobel, turning to the same subject, showed that by mixing nitro-glycerine with other substances, solid explosives which could be safely handled could be produced—among others, dynamite.

It is to dynamite that we owe our progress in mining, in the making of such railroad tunnels as those which now pierce the Alps and other mountain ranges; but of course dynamite has been abused by politicians and soldiers. Scientists are, however, no more to blame than they are to blame for an earthquake or a flood. The same thing can be said of poison gas.

Pliny was killed by breathing sulphur dioxide in the eruption of Vesuvius almost two thousand years ago. Chlorine was not isolated by scientists for warlike purposes, and the same is true of mustard gas and dynamite.

These substances could be limited to beneficent use, but when the aeroplane was perfected, men whose hearts were poisoned and whose brains were addled perceived that the aeroplane, an innocent invention, the result of long, disinterested and scientific effort, could be made an instrument of destruction, of which no one had ever dreamed and at which no one had ever deliberately aimed.

What then must be the spirit and policy determining the course of the new Institute? The answer is easy: the fearless and unham-

pered search for truth, the unlimited cultivation of the natural curiosity of human beings within the field of science. It is almost certain that efforts aiming at the immediately practical will fail unless they are based upon a long succession of experiments and endeavors that have no such practical use in mind. Unquestionably, disinterested scientists have accumulated knowledge which can and should be brought together for the purpose of relieving suffering, as happened, for example, in the case of insulin.

The history of science for two thousand years proves conclusively that no one can foretell or predict or plan the outcome of the untrammeled roving of the human spirit, searching for truth and truth alone. Whether these practical results shall be good or ill is no concern of those who have founded this institution. That is something that depends upon civilization.

Civilized men will resolutely refuse the ill and embrace the good and, unless the world can be governed by the ideals of civilization, nothing can save it from ultimate destruction. If the destination of the efforts made in the great German universities and the great German research institutions are to be determined by madmen like Hitler or bullies like Mussolini, the world will sooner or later destroy itself.

If the destination of these resources is to be determined by the spirit and ideals of the men who have founded this laboratory and the men who are enlisted in it, then we can look forward to a world in which peace and beauty and health and all the other good things of the human spirit may determine the conduct and the character of our lives.

MOXA, A STRANGE MEDICAL TREATMENT *

By Olga Jonkus, B. Sc. and Robert Charr, M. D.

THROUGHOUT the centuries and in various countries many crude and bizarre drugs were used in the hope of curing tuberculosis. Among these the juice of henbane, root of scordium mixed with large century plant, shavings of the hoofs of the ox and deer, as well as portions and secretions of the whole anatomy of practically every living creature, were used at one time or another.

According to Flick (1) the earliest mention of phthisis recorded is by the Chinese in the sixth century B. C., who regarded it as ulcer-

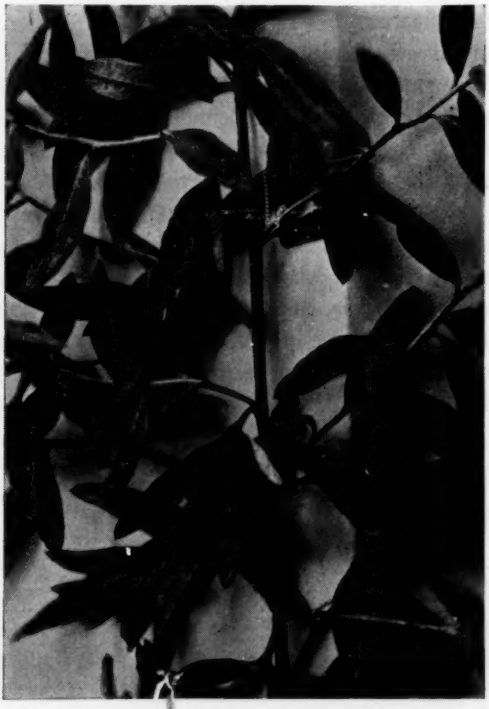

Fig. 1. Artemisia.

*From the Pharmacy of the White Haven Sanatorium, White Haven, Pennsylvania.

ation of the lungs, which was incurable. Palliatives such as licorice, almonds, barley and peach kernels were employed. Scrofulous tumors were treated with saline solutions, oyster poultices and sometimes sodium chloride to which small amounts of iodine had been added.

The most interesting treatment used for centuries by the Chinese and Koreans was moxa (2). In this technique small combustible masses used to produce eschar by being burned in contact with the skin. According to the Dublin College they were made from the leaves or the downy hairs of the leaves and stems of Artemisia chinensis Linné and Artemisia indica Willd (Artemisia vulgaris Linné), while Lindley states that it is the Artemisia moxa of De Candolle which was employed.

Moxa has been known to the Chinese and Koreans for centuries (3), being commonly used as a counterirritant and produces an effect similar to a mustard plaster. Aside from its use as a counterirritant, moxi-bustion or burning moxa has been used, and, strange as it may seem, still is recommended by the Chinese and Korean physicians of the old school in the treatment of early pulmonary tuberculosis. For this purpose the crude drug (Fig. 1) is collected while in the flowering state and the leaves are allowed to dry in the sun. When the leaves are thoroughly dried they are reduced to a fluffy mass, the downy hairs permitting cohesion without additional excipient.

The moulding is done by placing a portion of the mass between the thumb and first two fingers and by means of a gentle rotary motion it is formed into a cone with the base facing the palm of the hand and the rotating fingers tapering the other end into a conical point. The finished cone measures approximately two centimeters high, with the diameter of the base measuring one centimeter. The consistency of the cone should be fairly firm. In order to test it the cone is thrown five or six feet into the air and permitted to drop to the floor; upon landing the cone should retain its shape. If it breaks it is of no value.

The site of application of the moxa in pulmonary tuberculosis is determined as follows: the length of the second phalanx of the index finger of the patient's right hand is measured off with a piece of straw which is used as a measuring stick. The patient is then requested to sit on the floor with both arms tightly embracing the knees, which are drawn up to the chest. This position separates the scapulæ as widely as possible and at the same time enables him to endure the pain of the initial treatment better. With the patient sitting in this position, the

point of the first moxi-bustion is determined by measuring off two lengths of the straw from the third thoracic vertebra toward each shoulder.

During the early stages of the treatment, before the cutaneous nerves are completely destroyed, the patient experiences considerable pain. However, after a day or two days' application the nerves are sufficiently destroyed so that he ceases to feel further pain. Approximately ten to fifteen cones are ignited on the same points per day. Complete treatment consists of burning approximately two thousand cones. Day by day as the wounds on the back produced by the cones become deeper and wider the cones are made proportionately larger. In some cases where the chest wall is exceptionally thick small portions of powdered charcoal are added to the moxa with the view to increase the heat of the cone and prolong its burning.

In the latter stages the wounds on the back practically reach the parietal pleura of the lungs, having burned through the intercostal muscles. At this stage the patient experiences considerable pain both back and front apparently due to an irritation of the intercostal nerves. As soon as the patient complains of severe pain about the sternal region the treatment is considered finished. The entire course of treatments takes approximately six months.

During the time the patient receives moxi-bustion he must observe certain strict regulations both in diet and behavior. In regard to diet the patient is requested to eat as many raw eggs as possible, some taking at least a dozen daily. In addition he may take six or more bowlfuls of rice daily with various vegetables and soups. However, eating of meat is discouraged. He is also advised to observe strict celibacy and this is considered very important. During the period when no moxa is applied the patient rests in bed. Placed nearby is an urn in which small amounts of the drug are burned, thereby saturating the surrounding atmosphere with moxa fumes.

The points where the moxa is applied correspond approximately to the subapical areas of the lungs where pulmonary tuberculosis commonly develops. Severe burning of the chest wall and intercostal muscles, causing irritation of the pleura in the manner described, may possibly have some effect upon the tuberculous lesions if they are superficial.

Only the early cases of tuberculosis are treated by this method. The manner in which suitable cases are selected is interesting. When

the patient's relatives ask the doctor as to the advisability of the treatment, the doctor inquires as to whether the patient is strong enough to come to his office by horseback. If he is not able to do so, he is too far gone in the disease for the treatment to be beneficial. The patient strong enough to ride a horse may not travel by horseback nor in a carriage drawn by horses, but on a cart drawn by oxen, thus insuring a slow and careful journey entailing the least amount of fatigue.

Figure 2 illustrates one of the cases so treated. The patient was a Korean woman, aged 45 years, showing definite symptoms and signs of early pulmonary tuberculosis. Some members of her family died of tuberculosis. She received the treatment some twenty years ago. Since then she has been perfectly healthy and without symptoms relative to pulmonary tuberculosis. Note the scars produced by moxibustion (Fig. 2).

The purpose of this paper is not to advocate this form of treatment on tuberculosis. Even in the case used as an illustration we

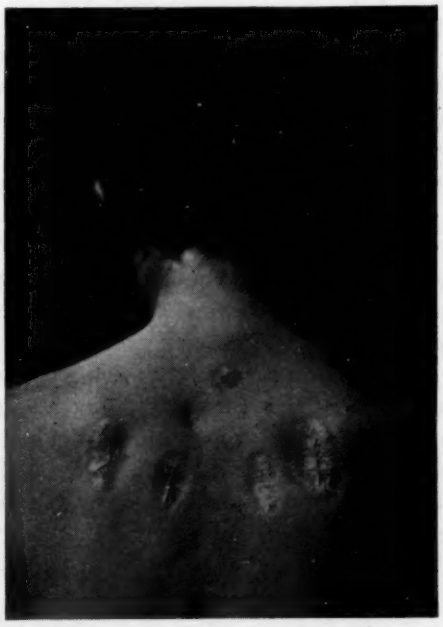

Fig. 2. The scars are produced by moxi-bustion. The largest scar on either side indicates the primary site of moxi-bustion.

have no scientific proof that the patient was cured of tuberculosis by moxi-bustion. This communication is merely to indicate one of the many crude and bizarre drugs used in the hope of curing pulmonary tuberculosis for which there is no specific drug as yet.

REFERENCES

(1) Flick, L. F.: Development of our Knowledge of Tuberculosis Philadelphia, 1925, pp. 30-31.

(2) The Dispensatory of the United States of America, J. B. Lippincott Company, Philadelphia, 1926, Twenty-first Edition, p. 1387.

(3) Charr, R.: Ancient Chinese Medicine. *Annals of Medical History*, Vol. 8, No. 3, p. 243 (1936).

New Therapeutic Agent of Treatment of Pneumonia

Found effective, experimentally, against various pathogenic organisms, among them pneumococcus, and hemolytic streptococci, the compound 2-(p-aminobenzenesulfonamido) pyridine, (2-sulfanilylaminopyridine) and designated as M & B 693, will be marketed by Merck & Co. Inc. as soon as definite pharmacologic and therapeutic claims have been established.

Pharmacologic investigations indicate that M & B 693 appears to protect the mouse effectively against 10,000 lethal doses of pneumococcus Type I and to afford considerable protection against 10,000 lethal doses of other types of pneumococci.

The chemotherapeutic possibilities of M & B 693 are shown in the results of treatment of 100 cases of lobar pneumonia, which gave a case-mortality rate of 8 per cent. compared with 27 per cent. in a control series. Other clinical results have been most encouraging.

The compound, which is a white, crystalline and almost tasteless solid, soluble in water at room temperature to the extent of approximately 1 in 1000, has been supplied by Merck & Co. Inc. for clinical investigation, and arrangements are being made to manufacture the new drug at the Merck plant in Rahway, N. J.

REPRINTED ARTICLE

THE EVALUATION OF YELLOW MUSTARD*

By Arno Viehoever and Walter L. Nelson

(Gross Laboratory for Biological and Biochemical Research, Philadelphia College of Pharmacy and Science, Philadelphia, Pa.)

Sinapis alba L. (white or yellow mustard) is a valuable spice and medicinal agent known since ancient times. Thus far, however, no method of evaluation has been worked out, probably because its composition is peculiarly different from that of the black or brown mustards. These yield, upon enzymatic fermentation, a volatile oil that can be quantitatively determined (1, 2), while white or yellow mustards yield a non-volatile oil, which, extracted together with the fatty oil, has not been isolated quantitatively. A method is herein described for the quantitative isolation of the glucoside sinalbin and for the estimation of the approximate amount of pure sinalbin present by means of its sulfur decomposition product obtained by the action of the enzyme myrosin.

I. Chemical Composition of Mustards

The chart shows the chemical composition of white mustard, contrasted to the composition of the black. The fermentative decomposition products are also mentioned. It is quite obvious that the black mustard, and especially the products formed as a result of the enzymatic action, have been studied more thoroughly. Quite probably enzymes other than myrosin, as found in black, occur also in yellow mustard, and, in consequence during their fermentative action, products may be formed, not as yet reported. The possibility also exists that the enzymatic hydrolysis with myrosin yields small amounts of other substances, not as yet identified. The results of the experiments with myrosin, related later in this paper, suggest such a thought.

*Presented at the Annual Meeting of the Association of Official Agricultural Chemists, held at Washington, D. C., November 1, 2, 3, 1937. Reprinted from *J. A. O. A. C.*, *21*, 488 (1938).

† Working with a grant of the Kilmer Research Fellowship.

COMPARISON OF THE CHEMICAL COMPOSITION OF SINAPIS ALBA AND NIGRA

Glucoside	Enzyme	Decomposition Products of Glucoside Enzyme			
		Mustard Oil	Sugar	Salt	Alkaloid
		Sinapis Nigra			
Sinigrin 1.3% (3)	Myrosin Saccharase Amylase Maltase Emulsin Peroxydase	Allylisothio-cyanate 96-97.77% Small Amount allylcyanide, Propenyl iso-thiocyanate Allylrhodanide Carbon disulfide	Dextrose	Potassium bi-sulfate	Sinapin
		Sinapis Alba			
Sinalbin 2.5% (4) Sinigrin (5)	Myrosin	Para-Oxyben zylisothio-cyanate 0.16% (4) (6)	Dextrose		Sinapin bisulfate

COMPARISON OF THE CHEMICAL COMPOSITION OF SINAPIS ALBA AND NIGRA (Continued)

Decomposition Products	Fatty Oils	Phytin-Acid	Other Constituents
	Sinapis Nigra		
Sinapin acid and Cholin	28.3% (7) Sp. gr. 0.9212 at 15° C. Solid. pt. —15° to —16° Ref. Ind. 1.4739 at 20° Acid No. 2.6 Calc'd. as free oleic acid 1.02% Sap. No. 173.2 Ester No. 170.6 Iod. No. (Wij's) 101.1 Glycerol 9.32 Unsaponifiable 1.18% Fatty acids 24.16% (94.16% Viehoever?)	Anhydro-hexamethylene di-Phosphoric acid	Protein 29.11% N.-Free Extr. 19.23% Crude fiber 10.9% Ash, 4.9% Water, 7.5% Pigment (8) Fat 28.1%

Sinapis Alba

28.1%	Protein 27.6%
(7)	Fat 29.7%
Sp. gr. 0.9214 at 15° C.	N.-Free Extr. Sub. 20.8%
Solid pt. —15° to —16°	Crude Fiber 10.3%
Ref. Ind. 1.4704 at 20°	Ash 4.47%
Acid No. 2.6	Water 7.2%
Calc'd. as free oleic acid 1.32%	Pigment (8)
Sap. No. 177.8	
Ester No. 175.2	
Ind. No. (Wij's) 96.8	
Glycerol 9.57%	
Unsaponifiable 0.98%	
Fatty acids 94.23%	

II. Isolation of the Glucoside Sinalbin

The sinalbin used was prepared by the following method: 100 grams of fresh yellow mustard flour was defatted with 1200 cc. of petroleum ether, successive portions of 200 cc. each being used. The defatted flour was thoroughly dried and extracted in the earlier experiments with boiling 85 per cent. ethyl alcohol. In later experiments the defatted flour of ground mustard was boiled on the steam bath with five to six times the amount of 95 per cent. ethyl alcohol used in three successive extractions. These were filtered as hot as possible through a Büchner funnel and then set aside in the refrigerator. The crystals separated singly on the glass wall, in the liquid, and on the bottom as white or whitish crystal aggregates. The alcoholic extract was allowed to stand overnight at room temperature. The sinalbin crystallized out in slightly yellow, needle-like crystals, which were further purified by recrystallization from boiling 85 per cent. ethyl alcohol and washing with acetone. Sinalbin that has been recrystallized and thoroughly washed will still show the presence of a yellow coloration when dissolved. Will and Laubenheimer (4) had already observed that sinalbin becomes yellow, forming sinapin compounds in the presence of traces of alkali, as present even in tap water.

The sinalbin, when estimated by extracting with several portions of alcohol and proceeding as above, showed a content in freshly prepared yellow mustard flour of about 2.5 per cent. The yield of crude sinalbin in a 200 gram sample was 5 grams; in a 100 gram sample it was 2.82 grams and in a 50 gram sample it was 1.35 grams. The

complete extraction of sinalbin was readily verified by the absence of a color reaction upon testing the final warm extracts with Millon's reagent, as they gave a red coloration with sinalbin according to Hartwich and Vuillemin (9).

A sample of sinalbin, free from yellow coloration and from ash and showing marked needle structure (with striking colors under the polarizing microscope) was prepared by the following method. The slightly yellow crystals of sinalbin were dissolved in boiling 85 per cent. ethyl alcohol and allowed to cool to approximately 60 degrees C. Ether was slowly added to this solution until the yellow color disappeared and a white precipitate was formed. (Avoid using a large excess of ether as then a heavy amorphous precipitate is formed.) This precipitate was dissolved in boiling 95 per cent. ethyl alcohol and filtered while still hot, and the sinalbin was crystallized from the filtrate. The sample had a melting point of 100-102 degrees C. The melting point determination was repeated with various lots and found to be practically the same. (Gadamer (3) reported a melting point of 83-84 degrees C. for the air-dry product, a loss of crystal water at 100 degrees C. with partial transformation and partial fusion, complete fusion at 138-140 degrees C.)

III. Isolation of the Enzyme Myrosin

The myrosin solution used was prepared as follows: Fifty grams of yellow mustard flour was extracted with 150 cc. of distilled water, an equal volume of 95 per cent. ethyl alcohol was added, and the mixture was centrifuged. The alcohol-water mixture was decanted off and the residue washed several times with 70 per cent. ethyl alcohol. After thorough washing the residue was mixed with 50 cc. of distilled water and allowed to stand for twelve hours at room temperature. It was filtered after standing, and barium chloride (20 cc. of a 10 per cent. solution) was added and the mixture set aside in an ice chest for three days. The solution was filtered, and a 10 cc. portion was boiled with 2 cc. of concentrated hydrochloric acid. No precipitation of barium sulfate was noted upon the addition of barium chloride. The filtered, clear, myrosin solution was used for the sinalbin-myrosin reaction.

	$BaSO_4$	Sinalbin Calc'd from $BaSO_4$	Purity
	gram	grams	per cent.
Series I			
A. Myrosin solution—100 cc. Sinalbin (recrystallized)—1.3856 grams	.3964	1.246	89.92
B. Myrosin solution—100 cc. Sinalbin (recrystallized)—1.4826 grams	.4236	1.332	89.84
Series II			
A. Myrosin solution—50 cc. Sinalbin (not purified)—.5023 gram	.1320	.4151	82.62
B. Myrosin solution—50 cc. Sinalbin (not purified) X—.5123 gram	.1340	.4214	82.25
Series III			
A. Myrosin solution—50 cc. Sinalbin (ether purified)—.2890 gram	.0820	.2578	89.20
B. Myrosin solution—50 cc. Sinalbin (ether purified)—.2072 gram	.0589	.1846	89.09
Series IV			
A. Myrosin solution—20 cc. Sinalbin (not purified)—.0774 gram	.0197	.0620	80.08
Series V	.0162	.0141	86.83
A. Myrosin solution—20 cc. Sinalbin (rechystallized once)—.0162 gram			
Series VI			
A. Myrosin solution—30 cc. Sinalbin (acid purified)—0.2 gram No sharp M.P. sublimes between 140-145° C.	.0488	.1534	76.7
Series VII			
A. Myrosin solution—30 cc. Sinalbin (alcohol purified)—0.2 gram M.P. 105-107° C.	.0604	.1856	92.8
B. Myrosin solution—20 cc. Sinalbin (recrystallized once)—.0152 gram M.P. 105-107° C.	.0363	.1141	92.4
Series VIII			
A. Myrosin solution—20 cc. Sinalbin (filtered and precipitated from alcohol solution)—0.0966 gram	.0293	.0921	95.4
Series IX			
A. Sinalbin (recrystallized)—0.0577 gram M.P. 98° C.	.0171	.0539	93.4
Series X			
A. Sinalbin (recrystallized)—0.0384 gram M.P. 102-103° C.	.0122	.0383	99.96

IV. The Activity of Myrosin Upon Sinalbin

The reaction between sinalbin and myrosin was carried out in tightly fitting glass-stoppered bottles. Weighed amounts of sinalbin were added to the aged myrosin solution and agitated to insure solution (10). Toluene (1 per cent. of the liquid volume) was added, and the mixture was set aside at room temperature for twenty-four hours. This solution was then boiled with 3 cc. of concentrated hydrochloric acid, and barium chloride (20 cc. of 10 per cent. solution) was added. The precipitated barium sulfate was filtered into a weighted Gooch crucible, dried and weighed as barium sulfate. The reaction between sinalbin and myrosin is assumed to proceed as follows:

$$\underset{\text{Sinalbin}}{C_{30}H_{42}O_{15}N_2S_2} + \text{Myrosin} + H_2O = \underset{\text{Dextrose}}{C_6H_{12}O_6} + \underset{\substack{\text{Para hydroxy-}\\\text{benzyl-iso-}\\\text{thiocyanate}}}{C_7H_7O.N\,CS} + \underset{\substack{\text{Sinapin acid}\\\text{sulfate}}}{C_{16}H_{24}O_5N.H\,SO_4}.$$

The general procedure followed was that of Neuberg and Wagner (10), who studied the enzymatic effect of myrosin on sinigrin.

The molecular ratio is: 1 Ba SO_4 = 1 sinalbin. The following general equation was used for calculating the purity of sinalbin:

$$\frac{\text{Mol. Wt. of Sinalbin} \times \text{Wt. of } BaSO_4 \text{ found} \times \text{Per cent.}}{\text{Mol. Wt. of } BaSO_4 \times \text{Wt. of Sinalbin used}} = \frac{\quad}{100} = \% \text{ of Sinalbin.}$$

The preceding table lists the results obtained on samples of sinalbin.

Conclusions

1. Estimation of the glucoside sinalbin in yellow mustard flour by extraction with boiling ethyl alcohol showed a content of sinalbin of approximately 2.5 per cent.

2. The purity of the samples, without recrystallization, determined by its decomposition products with myrosin, gave results of 82-83 per cent. sinalbin.

3. The determination of sinalbin on recrystallized samples shows a purity varying from 89.09-99.96 per cent., which indicates the possibility of evaluating yellow mustard by establishing a check on the amount of the isolated glucoside.

4. The recrystallized samples of sinalbin were ash free, gave water-clear solutions in alcohol (hot) and cold water, and a melting point of 100-102 degrees C., as compared with the literature reports of 84 degrees C. for the air-dried, and 138-140 degrees C. for the oven-dried sinalbin.

5. It is reasonable to assume that the enzymatic hydrolysis does not always go to completion, or that side, if not reversible, reactions might take place, as they evidently do in the enzymatic breakdown of sinigrin, the glucoside of black mustard.

BIBLIOGRAPHY

(1) Viehoever, Clevenger and Ewing: *J. Agr. Research, 20,* 117-139 (1920).
(2) *Methods of Analysis, A. O. A. C.,* 1935, 450.
(3) Gadamer: *Arch. Pharm., 235,* 38, 83, 570 (1897).
(4) Will and Laubenheimer: *Ann., 199,* 150 (1879).
(5) Clauda: *Staz. sper. agrar. ital., 52,* 544 (1919).
(6) Salkowski: *Ber., 22,* 2143 (1889).
(7) Grimme: *Pharm. Centr., 54,* 157 (1913).
(8) Koenig-Boemer: *Nahrungsmittelchemie,* 4th Ed., *1,* 962 (1903).
(9) Hartwich and A. Vuillemin: *Apoth. Ztg., 20,* 189 (1905).
(10) Carl Neuberg and J. Wagner: *Biochem. Z., 174,* 457-463 (1926).

Chinese Plant Grown in U. S. A. Reported Source for a New Food and Drugs

The Ko plant, also called Kudzu, alias Pueraria Thunbergiana, available in the Chinatowns of America as a fresh vegetable, is described in the September '38 issue of the *Journal of the New York Botanical Gardens* as having little-explored qualities that may prove important in U. S. A. in medicine. It is a vine valuable for gardens because of its rapid growth. Its tuber is a source of starch, its fibre useful in paper manufacture. "In two years a vine covered an area of 28 square meters." The seeds and flowers are used in China "in cases of alcoholic excess." Decoctions made from the root are used in the treatment of colds and influenza, in China.

ABSTRACTS FROM AND REVIEWS OF THE LITERATURE OF THE SCIENCES SUPPORTING PUBLIC HEALTH

Bacteriology . . . . Louis Gershenfeld, B. Sc., Ph M.
Biochemistry, Nutrition, etc. . . . Arno Viehoever, Ph. D.
Biology . . . . . Marin S. Dunn, Ph. D.
Chemistry . . . . . Arthur Osol, Ph. D.
Pharmacy . . . . . E. Fullerton Cook, Ph. M.
and their assistants

THE PHARMACOLOGY OF THE VAGAL SYSTEM

By Horatio C. Wood, Jr., M. D., Ph. M.

IN a previous article (Am. Journ. Pharm., Aug. 1938) it was pointed out that the vital organs are regulated by the autonomic nerves, of which there are two groups, the sympathetic and the parasympathetic. Most of the latter nerves have their origin inside of the skull and pass out with what are known as the cranial nerves, although a few originate in the sacral part of the spinal cord. The most important of the parasympathetic nerves pass out as a part of the tenth pair of cranial nerves, commonly called the vagi, hence the term of "vagal system" is sometimes applied to the entire group.

Most of the viscera receive nerve supply from both the sympathetics and the parasympathetics. In such cases the two systems are usually antagonistic; that is if one carries excitor impulses the other will be inhibitory. The proper functioning of the body depends on a balance between the two groups; stimulation of one or depression of the other will lead to the same type of malfunction.

The results of the parasympathetic stimulation which are of greatest interest to the pharmacologist are: Dilatation of the pupil of the eye, slowing of the heart rate, constriction of the bronchi, relaxation of the arteries, augmented intestinal peristalsis and increased secretion of sweat and saliva; they also have some influence, at present not well understood, on the activity of the voluntary muscles.

In the previous paper we showed that the modern concept of the mode of action of the sympathetics is that the nerve impulse causes the formation at the juncture of nerve and muscle of a material closely related to, or chemically identical with, epinephrine, and that the drugs which produce similar changes are therefore referred to as the adrenergics. An analogous condition holds for the parasympathetic system, the difference being that in the latter case the activating material formed is acetylcholine. Choline ($(CH_3)_3N(OH)CH_2.CH_2OH$) is a base which has long been known as a constituent of lecithin, which is found richly in nerve tissue; it occurs also in a number of vegetable substances. It is closely related in chemical structure to muscarine (the poisonous alkaloid of certain mushrooms) and which has long been classed by pharmacologists as a stimulant to the vagal system. Choline has a similar, but relatively feeble, action; but acetylcholine ($(CH_3)_3N(OH)CH_2.CH_2OCOCH_3$) is extraordinarily potent. According to Hunt, 3 one-hundred-millionths of a milligram per kilo of body weight is sufficient to cause demonstrable change in the circulation of a cat. Almost equally astounding is the rapidity and fugacity of its effects. The lack of durability seems to be due to its almost instantaneous destruction by an enzyme—called cholinesterase—which reduces it to choline.

Acetylcholine has been employed, in a more or less experimental way, as a remedial agent for the relief of arterial or intestinal spasms, but in view of the transitory character of its action it is not surprising that it has not proven of great practical importance. Recently two related compounds known as Mecholyl ($(CH_3)_3N(Cl)CH_2.CH(CH_3)OCOCH_3$) (acetylbetamethylcholine chloride) and Doryl (carbaminoylcholine chloride) ($(CH_3)_3N(Cl)CH_2.CH_2OCONH_2$) have been introduced into medicine and give some promise of becoming useful remedies. They have been used internally for the relief of arterial tension and to excite contractions of the intestines or urinary bladder. Considerable attention has been given to the use of mecholyl by iontophoresis in local vascular spasms. Both are potent drugs and capable of serious damage if carelessly employed.

Physostigmine Group

It has long been known that physostigmine produces physiological effects very similar to those of parasympathetic stimulation, but there has been much difference of opinion as to the seat of its action. The

present evidence is that this alkaloid does not act directly on either the nerves or the organ parenchyma, but that it inhibits the cholinesterase from reducing the natural acetylcholine of the body. While it is still an important remedy in ophthalmology its value as a systemic drug has been greatly lessened by certain secondary actions. A synthetic compound which seems to possess the same power of preventing the enzymic effect of cholinesterase has been introduced into medicine under the title of Prostigmin. It has apparently relatively less action than physostigmine in its effects on the eye or circulation but has been found of value for the relief of intestinal atony. It has excited most attention, however, as a palliative in myasthenia gravis. This is a disease of unknown origin marked by a progressive weakness of the voluntary muscles and often leading to the death of the sufferer. The cause is a mystery, leads to a progressive loss of power in the voluntary muscles and the prognosis is highly unfavorable. While at present it seems very doubtful that prostigmin will bring about a permanent recovery of the muscle function, it has in a number of cases resulted in the temporary restoration of function and thereby contributed greatly to the patient's comfort.

SELECTED ABSTRACTS OF PAPERS PRESENTED BEFORE THE SCIENTIFIC SECTION OF THE A. Ph. A. AT MINNEAPOLIS MEETING 1938

The Reduction of the Alkalinity of Hypochlorite Solutions With Sodium Bicarbonate. A. Osol and J. R. Cox. In the preparation of diluted solution of sodium hypochlorite from the stronger official solution the alkalinity of the latter is decreased by adding sodium bicarbonate. Certain writers have explained the mechanism of this reaction as consisting of the repression of ionization of sodium hydroxide by the common sodium ion. Since other sodium salts do not have the same effect, this cannot be the explanation. The authors reported the pH values of solutions containing sodium hydroxide and sodium bicarbonate and showed a comparison with corresponding values for sodium carbonate solutions with and without bicarbonate. From these data it was concluded that the reaction involved is as follows: $OH^- + HCO_3^- \rightarrow CO_3^{--} + H_2O$ with the equilibrium displaced to the right sufficiently to reduce hydrolysis below the point where a red coloration is obtained with phenolphthalein powder.

Cholesterol in Ointments. Ping-lu Li and R. A. Kuever. A glass-capillary 10 cm. in length, 1 mm. internal diameter with an enlarged end 2 mm. internal diameter and 3 mm. in length was used for determining the melting point of ointment bases.

A new ointment composed of 98 per cent. of white petrolatum and 2 per cent. of cholesterol was proposed.

Ammoniated mercury ointment was made by both the U. S. P. XI and the new wet process. Ointment of phenylmercuric nitrate, 1 :1500, was made with white petrolatum, and another with the new ointment base.

The antiseptic potency of the four ointments was determined by the modified reddish agar-cup and agar-plate methods, using Bacillus subtilis and Staphylococcus aureus as test organisms.

The mercury coefficients obtained from the data led to the following summary and conclusions:

(1) That ammoniated mercury ointment made by the wet process, with the new cholesterol base, has a higher antiseptic potency than that made by the U. S. P. XI method.

(2) That phenylmercuric nitrate ointment made with an aqueous solution of the salt, in a base containing cholesterol, possessed distinctly higher antiseptic potency.

(3) That with the new base ointments can be made containing large quantities of water, making an emulsion having an aqueous inner phase and oleaginous outer phase.

. . .

Decomposition of Citric Acid by Ferric Iron. S. I. Peltz and E. V. Lynn. The decomposition of citric acid in the presence of ferric iron and sunlight was formulated by Burt in 1928, but evidence was presented that this conception is wrong. When ferric hydroxide and a solution of citric acid are exposed to light, part of the acid is oxidized to carbon dioxide and the iron is reduced to a soluble ferrous salt, presumably the citrate. Neither acetone nor formaldehyde could be found. Alkali citrates under the same conditions dissolve the iron without giving carbon dioxide or any ferrous salt.

. . .

A Study of Anesthetic Compounds for the Treatment of Burns. D. T. Meredith and C. O. Lee. Benzocaine picrate has

been prepared and its anesthetic and antiseptic properties tested. It is a yellow, crystalline solid, melting at 161 to 162 degrees. An analysis of it indicates that one mole of benzocaine is combined with one mole of picric acid. This compound differs both on melting point and combining ratios from the one which has been reported in literature.

Attempts were also made to combine benzocaine with tannic acid. The results were less favorable than with the picric acid.

. . .

Ampul Glass: Chemistry and Pharmacology. R. K. Snyder. The literature on the history and composition of ampuls was reviewed and discussed. The nature of the attack of water on glass and methods for determining the resistance of glass to this attack were described as well as results obtained by applying them to various kinds of glass containers. These methods are based upon the compounds dissolved from the glass. Estimations of the alkalinity yielded, form the basis of some, while determinations of the electro-conductivity and total residue provide for the remainder. The chemical composition, characteristics and methods used are mentioned and it is shown that the predominating compound is sodium silicate.

The literature on the pharmacological action of sodium silicate and colloidal silica was reviewed and discussed. Experimental work on yeast, daphnia, goldfish, rats, rabbits and dogs was described and the conclusions given. The results from these indicate that a 1 per cent. solution is required before toxicity is readily noted in the case of mammals. A series of clinical experiments involving intravenous saline solutions containing small amounts of sodium silicate and colloidal silica obtained from sterilization in soft glass containers, indicate that in these concentrations they have no pharmacological significance.

. . .

Insect Infestation of Drugs. B. L. Blumberg. An extensive list of insects attacking drugs and the specific drugs which they attack has been compiled from various sources.

The literature on the physical changes produced in drugs during infestation, and the chemical constituents and structures removed from drugs by insects was presented. In general it would seem that carbohydrate containing drugs are quite susceptible to insect attack, but if other beetles, e. g., S. panicea may be judged by Tribolium, carbo-

hydrates are not the only substances required. Protein and/or facts are also necessary. Tribolium is not a serious drug pest; of the thirteen drugs listed in U. S. P. XI as being especially liable to insect attack, only ergot and linseed permitted this beetle to reproduce. Orris, ginger and althea root sustained life for varying lengths of time. Contrary to previous reports, Tribolium could not be cultured in capsicum, nutmeg, cinnamon or mustard. Tannic acid and calcium oxalate individually are unfavorable to Tribolium, while aloin has little effect. It was recommended that further work be done on the pharmacognostical aspects of insect-infested drugs with a view to furnishing more complete information on the chemical and botanical alterations produced in such drugs. This may ultimately influence official descriptions and standards. It is also suggested that an analytical method for the identification of insect fragments and eggs be perfected and included in standard pharmacognosy books. One such method previously devised was reviewed.

. . .

A Characteristic Color Test for Identification of Cannabis Sativa. J. C. Munch. A characteristic color test has been developed for the detection of Cannabis in pharmaceutical preparations, and in mixtures with tobacco. A low-boiling petroleum ether, or an acetone solution, is evaporated to dryness, purified if necessary, then treated with paradimethylaminobenzaldehyde solution, followed by water. A characteristic indigo-violet color is obtained. This may be readily differentiated from the color produced by certain ergot alkaloids. No other product has been found giving a similar reaction. This test has been applied to a number of known and unknown samples with satisfactory results.

. . .

Increase of Bactericidal Action of Germicides by Variation of pH. P. Goedrich. The action of germicides in the lower ranges of pH has been studied and it has been found that a decrease in pH generally corresponds to an increase in germicidal effect. As it is known that acids also possess germicidal properties, controlled experiments have been made to establish how far the acids are responsible for this increase. It was found that only a minor part of the increase in germicidal effect can be attributed to the acid alone and that the

combined action of acids or acid salts with the germicides is responsible for the considerable increase in germicidal effect. It was found that this action is not selective but is applicable to all types of bacteria, molds, fungi, etc. As a consequence of these findings it will be seen that germicidal solutions, which do not possess an effect upon resistant spore-bearing organisms will become Sporicides in the same concentration at a lower pH. As there is evidence that solutions of low pH have no harmful effect in open wounds or on the mucous membranes, the acidification of germicides within certain limits can be regarded as not objectionable to their use.

* * *

Study of the Assays of the Powdered Extracts of Belladonna and Hyoscyamus. H. H. Fricke and K. L. Kaufman. This study led to the following conclusions:

1. Atropine is not stable to water-bath temperatures when its ethereal solutions are evaporated to dryness, though hyoscyamine is. When chloroform was used as the solvent, there was some destruction of both alkaloids, though the quality of the reagent influenced markedly the degree of destruction. The addition of 5 cc. of neutral alcohol before the final few cc. of chloroform are evaporated retards the decomposition of the alkaloids in this solvent.

2. There is some evidence of alkaloid destruction in the U. S. P. XI assay of the powdered extracts of these drugs. The U. S. P. X method of analysis is more satisfactory than the U. S. P. XI process because (a) the latter method specifies a difficult filtration step, (b) the residue for titration is more nearly free of chlorophyll, (c) the alkaloids are more completely extracted, and (d) concordant results are easier to obtain. The most satisfactory assay was obtained by using the U. S. P. X extraction method and then completing the analysis by the U. S. P. XI process.

3. The degree of alkalinity does not affect the amount of alkaloid extracted by the U. S. P. X method, but large excesses of alkali tend to form troublesome emulsions. Stronger ammonia T. S. is recommended for extraction.

4. Corn, rice, wheat, potato, and arrowroot starches, and chlorophyll apparently do not absorb atropine and hyoscyamine to any appreciable extent. Corn and rice starch tend to form troublesome emulsions and render the alkaloid extraction difficult. Wheat starch is

better in this respect, but potato and arrowroot starches were the most satisfactory diluents examined.

. . . .

Time Variants in the Assay of Oil of Peppermint. L. H. Baldinger. In order to determine whether an increase in the length of time of acetylation and of refluxing in the assay of oil of peppermint would result in an increase in the total menthol content, samples of oil of peppermint were acetylated for periods of time varying from fifteen minutes to three hours, and the acetylated samples were refluxed with alcoholic potassium hydroxide for periods from fifteen minutes to two hours.

From a general average of eighty-four samples it appears that acetylation for more than fifteen minutes is not essential, but that more consistent results are obtained when the acetylated oil is saponified by heating for sixty minutes.

Higher percentages of total menthol in those samples of oil acetylated for three hours are believed to be due to reactions between the oil and acetic anhydride other than that involved in the acetylation of menthol.

To Transfer Designs

For various uses it is frequently desired to transfer a design, print, or drawing, to paper, cloth, wood, or other surfaces. This can readily be done by employing the following simple solution of familiar ingredients:

Glycerine	1½
Soap	4
Alcohol	10
Water	10

With this liquid wet thoroughly the print or drawing to be transferred. Remove any excess of liquid with blotting paper, and invert print on the paper, cloth, or other surface to which it is to be transferred. Lay a piece of paper over this and rub with a blunt article such as a knife handle.

SOLID EXTRACTS

By Ivor Griffith, Ph. M., Sc. D.

Despite the form in which this information is presented it may be accepted as trustworthy and up-to-date. Original sources are not listed but they may be obtained upon request.

"Little thinking she walked in pride
In the winding sheet where the silkworm died."

And silk is just that! Latterly there has been created in America a brand new silk, not rayon, and composed largely of a castor oil derivative and an odd compound called cadaverine. Hence we have a silk, not of "the winding sheet where the silkworm died," but made theoretically at least, of the very corpse of the silkworm itself.

In fact, one of the ways to prepare the new synthetic silk fiber might be to make it out of a human corpse. Cadaverine, the basic ingredient of this silk, is a decomposition product that is formed in the human body after burial. Cadaverine is formed by nature as a decay product of the lysine which occurs in many of the body proteins, in serum albumin and in the fibrin of clotted blood. After death lysine breaks down and forms the evil-smelling and poisonous cadaverine. Cadaverine is known to chemists as pentamethylene-diamine.

Still will it be more poetic to sing with Herrick—"When as in silk my Julia goes" rather than to prose with the callous chemist "Clothed in a corpse my Julia goes"!

"Try it on the dog," is an ancient bit of badinage, and more than likely a verbal relic of those good old days when poisoning was a fine art. But pharmacologically trying it on the dog, the guinea pig, the daphnia, is a fairly effective way of standardizing and evaluating medicinals. These animals afford conclusions which could have come otherwise only by actual tests on human beings. But it is a mistake on the other hand to believe that findings on animals can always be translated to expected results on human beings.

Here is a classic example of the fact that Fido's insides operate a little differently from his master's.

From experiments on dogs it has been shown previously that during intestinal obstructions the amount of potassium in the blood

serum increases and it has been postulated that death in these animals, not given remedial treatment, was due to potassium poisoning.

On patients at the Mayo Clinic having this serious affliction, the scientists tested out this hypothesis to check human against animal behavior. Contrary to findings in animals the human patients showed, not an increase in potassium in their blood serum, but an actual decrease.

These new studies show how slow medicine must be in any attempt to translate discoveries on animals into conclusions on human patients.

Instead then of making every effort to decrease the potassium content of the blood serum in cases of intestinal obstruction, patients are now being given injections of solutions containing small amounts of potassium, calcium and sodium salts as well as sugar for its quick energy content.

Acids even in high dilution are irritant to tissue, especially to injured tissue. Proof of the accuracy of this statement may be had by dropping a little lemon juice into a fresh cut. But now we learn that the acid of lemon juice (citric) or other such acids, added to antiseptics increase their germ-killing propensities tremendously.

Potent phenylmercuric nitrate, known in the trade as P.M.N., is about 60 times more effective at an acidity rating, or pH, of 3 than it is at an acidity rating of 7, corresponding to the acidity of water.

Under the same experimental conditions, much-used hexylrescorcinol, better known as S.T. 37, is about 30 times more effective. Similarly merthiolate shows a germ-killing gain of seven times, tincture of iodine a gain of four times and carbolic acid a gain of one and a half times.

"Although it has been known for some time that acidity has an enhancing effect on the bacteriostatic properties of benzoic acid in so far as its use in tomato juice and similar preparations is concerned, it was not realized that some micro-organisms are much less resistant to destruction by certain chemicals with an increase in acidity," the chemists declare.

"As a result, it should be possible to buffer the acidity of our commercial antiseptics so as to make them much more effective than has been possible heretofore."

Vitamins continue to have the attention of scientific investigators, which is not strange when it is recalled that these vital substances are really no more than compressed fractional condensates, representing the essence of distilled sunshine. Testing for their presence has been in most part a tedious animal test, but latterly we find that physico-chemical tests are being developed with much success. For instance, in the case of vitamin B_1, the power of the "electric eye" can take much of the human element out of such assays.

Previously the Netherlands scientist Jansen had discovered that when vitamin B_1—known chemically as thiamin—is oxidized it turns blue if irradiated with ultraviolet light. The intensity of the blue fluorescence is a measure of the amount of vitamin present. With a photoelectric cell workers are now able to determine, without human error of judgment, the intensity of the blue color and hence the concentration of the vitamin.

Sulfanilamide, that useful drug, whose reputation was for a while so sullied by its fatal elixir, continues to furnish new proofs of its panaceal properties. It is now said to have its place in preventing as well as in curing scarlet fever.

Take the case of the eleven English choir boys, one of whom contracted scarlet fever while in Chicago. He was taken to the municipal contagious disease hospital and then there were ten.

The ten were given twenty cc. each of pooled convalescent scarlet fever serum and five were given sulfanilamide. On the eighth day one of the group took scarlet fever; then there were nine.

Mild forms of scarlet fever and streptococcic sore throat seized four others and then there were five.

The final five remained well, the same five that had been given sulfanilamide during the course of their isolation. Happily the story is ended with stating that the other six (who did not receive sulfanilamide) recovered after varying periods of convalescence.

While it is a fact that many of the world's startling and important discoveries in the field of science have come not in the line of organized research but rather as the result of a fortuitous accident, we still do well to ponder over the words of McLester that the safe progress is a "progress in which, with due observation of traffic rules, the ultimate destination has been reached, not by short cuts but by long, laborious travel over a well-worn highway."

BOOK REVIEWS

Done by persons, unafraid to upbraid, but perfectly willing to give praise where praise is really due.

Fischer's Textbook of Chemistry for Pharmacists. Revised by George Frerichs, Director of the Pharmaceutical Institute of the University of Bonn, Germany. 722 pages, in German, 46 illustrations. F. Enke, Stuttgart, 1938, bound. Price 40.50 marks.

A discussion of general chemical conceptions precedes the major chapters on inorganic chemistry, embracing non-metals and metals, and organic chemistry, including classification and general properties of organic compounds. Brief chapters on volumetric and physical methods for recognition and testing of drugs conclude the book.

Various chapters were abbreviated in the revision in order to bring new data, e. g., sections, dealing with radio active substances, isotropy of elements, atomic structure, and especially to make room for the discussion of chemical compounds produced in nature by plants or animals, as sterols, hormones, vitamins, enzymes, alkaloids, glucosides, etc.

Through abundant use of small print a wealth of data is presented for the well planned instruction of the pharmaceutical chemist. So much progress has been made in the practical use of varied chemical compounds that one should probably not be too critical with the omission of pituitary substances and cholagogic hormones, as cholecystokinin, of vitamins E (tocopherols), F and K, of common moth repellants as fluorsilicates, and of new insecticides as rotenone and the pyrethrins.

In the whole this revision well fulfills its mission as a textbook.

ARNO VIEHOEVER

A Concise Pharmacology of the More Important Drugs, Together With an Outline of Their Therapeutic Applications and an Introduction to the Art of Prescribing. By F. G. Hobart, Ph.C., and G. Melton, M.D., M.C.R.P. Distributed by Chemical Publishing Co., New York. $3.00.

Anyone who tries to condense the subject of pharmacology into 164 pages, of 5 x 7 inches, must not only exert the utmost care to

utilize every possible scrap of space but should also show a unique literary genius for condensation. Neither of these qualities are obvious in this volume. Space is wasted by the typographic arrangement, by the insertion in detail of ridiculously simple prescriptions, and little judgment is shown in selecting the important from the unimportant.

Anyone who, in this day and age, wants to sell a book on pharmacology, which you can slip in your pocket, for $3.00 must offer a masterpiece of scientific literature, which this book is not. While the statements made are for the great part accurate (and sometimes surprisingly up to date) there is so much important matter that has been omitted that we confess the book does not seem worth the price.

H. C. Wood, Jr.

THE HOUSE OF LLOYD

The spotlight of public interest will again be focused on achievements of the Lloyd family in the field of pharmaceutical chemistry when civic bodies of Cincinnati and medical and pharmaceutical interests of the nation join in a tribute to Dr. John Thomas Lloyd, son of the late great Dr. John Uri Lloyd. The occasion will be the dedication, on Friday, October 21, of a laboratory opened by Dr. Lloyd at 412 Central Avenue, Cincinnati, for research and development of American plant drugs.

Civic bodies, including the Cincinnati Chamber of Commerce, and a number of medical and scientific societies will be prominently represented in the activities arranged for the occasion. Mayor James G. Stewart, of Cincinnati, and Governor A. B. Chandler, of Kentucky, a personal friend of the Lloyd family, will have leading places on the program. Leaders in medicine and pharmaceutical chemistry have accepted invitations to be in Cincinnati to participate in the unique tribute.

While most of the program will center at Dr. Lloyd's new laboratory, a civic dinner in Dr. Lloyd's honor is being planned by the Cincinnati Chamber of Commerce, to be given at a leading hotel.

There will be a reception at the new Lloyd laboratories from 1 o'clock till midnight, with dancing from 8 to 11:30 o'clock. The

dedication exercises will take place at 3 o'clock. Earl F. Metcalfe will preside. Following an invocation by Rev. Frank H. Nelson, rector of Christ Church, there will be an address of welcome by Mayor Stewart, to whom Mr. Metcalfe will then turn over the chairmanship of the occasion. George D. Beal, Phar. D., Ph. D., research director at Mellon Institute, Pittsburgh, will deliver an address on "The Black Page"; Dr. Martin H. Fischer, M. C., Phar. D., of the faculty of the Medical College of the University of Cincinnati, on "The Other Half of the Blank Page." Governor Chandler also will speak.

At the speakers' table at the civic dinner to be given in Dr. Lloyd's honor will be W. F. Wiley, editor and publisher of the Cincinnati Enquirer, and president of the Chamber of Commerce; Dr. J. Leon Lascoff, president of the American Pharmaceutical Association; Dr. Alfred Friedlander, dean of the College of Medicine, University of Cincinnati; Dr. Morris Fishbein, secretary of the American Medical Association, and editor of the Journal of the A. M. A.; Frank Freericks, secretary, American Druggists Fire Insurance Co.; Dr. D. E. Jackson and Dr. Albert P. Mathews, College of Medicine, University of Cincinnati; Dr. Byron H. Nellans, dean of the Eclectic Medical College, Cincinnati; Harry Baskind, president, Ohio State Pharmaceutical Association; Dennis Murphy, president, Ohio Valley Druggists Association; Dr. H. Shipley Fry, Department of Chemistry, University of Cincinnati; Hulbert Taft, editor and publisher, Cincinnati Times-Star; J. K. Lilly, head of Eli Lilly Company, Indianapolis; Jerry McQuaide, editor, Drug Topics and Drug Trade News; Charles G. Merrell, president, William S. Merrell Company; George Fries, president of Cuvier Press Club, Cincinnati; Carl D. Groat, editor, the Cincinnati Post; Dr. Walter R. Griess, dean, Cincinnati College of Pharmacy; Dr. Richard S. Austin, president, Cincinnati Academy of Medicine, and Dr. Charles R. Campbell, president, Board of County Commissioners, Cincinnati.

At the invitation of the civic sponsors of the unique tribute, Mr. Metcalfe, who is general manager of the John T. Lloyd Laboratories, is cooperating in the arrangements.

Plans for the tribute serve to call attention to the fact that Dr. John Thomas Lloyd, was not content to rest upon the laurels won by his distinguished father, but has made a name for himself, particularly

in the field of colloidal chemistry. He has many discoveries of importance to his credit.

Dr. Lloyd's new laboratory is founded on the belief that American resources in plant life are adequate to meet nearly all requirements in the field of pharmaceutical chemistry. The distinguished Cincinnati scientist is seeking, through research and experimentation, to develop complete American self-sufficiency in this field, contending that should America ever be isolated from the rest of the world, through war or any other cause, its resources in plant life would be sufficient for all purposes. His is a "pharmaceutical declaration of independence." It is a bad habit of thought, he contends, to believe that America must rely upon Europe for its important medical preparations.

He has already developed a large number of plant drugs, which have become known in the medical and pharmaceutical world as "Lloydson medicines." His ambition is to expand upon these achievements through the facilities of his new research laboratories.

Effective Nail Bleach

Workers with inks, dyestuffs, and other color-matter in various lines of industry often suffer from persistent stains or discolorations of the fingernails which cannot be removed even with hard scrubbing. Such discolorations can only be removed by bleaching them out of the nails. The plant chemist—or corner druggist—can easily make up an effective preparation for such purposes, however, by using the following simply compounded formula utilizing the exceptional solvent powers of glycerine:

Oxalic acid	4
Glycerine	100
Rose water (triple)	900